

**Utah Department of Transportation**



**Supplemental Specifications  
for**

**2005 Standard  
Specifications**

**FOR ROAD AND BRIDGE  
CONSTRUCTION**

**U.S. Standard Units (Inch-Pound Units)**

**Issued July 11, 2006**

# Memorandum

UTAH DEPARTMENT OF TRANSPORTATION

**DATE:** July 11, 2006

**TO:** Holders of Hard Copy of Standard Specifications

**FROM:** Barry Axelrod, CDT  
Standards and Specifications

**SUBJECT:** Supplemental Specifications Distribution, dated July 11, 2006

Applicable files for the change are attached. Maintain these files as a supplemental update to the UDOT Standard Specifications dated January 1, 2005. No pages are to be removed or replaced in the basic book, electronic or hard copy.

If you are in need of electronic copies of any Standard or Supplemental Specification please refer to the Standards and Specifications Web site at <http://www.udot.utah.gov/index.php?m=c&tid=302>. From there select the **2005 Standards** subtopic.

Please note that the 2005 Standards are still in effect. There is no plan to issue a new set of Standards for a 2006 version.

If you have any questions or problems with the electronic files contact me at 801-964-4570 or by email at [baxelrod@utah.gov](mailto:baxelrod@utah.gov).

Attachments

## **Listing of Supplemental Specifications**

### **Issue Date: March 14, 2005**

Revised February 24, 2005

Section 01282M Article 1.1 Paragraph D added and Article 1.14 Paragraph E replaced.

Section 01284 New section added

Section 02785M Replaces Table 1 to correct reference callout from AASHTO to ASTM

Section 02843 Entire section revised.

Section 06055M Article 1.2 Paragraph F added and Article 2.2 Paragraphs A and D modified.

### **Issue Date: May 10, 2005**

Revised April 28, 2005

Section 02827 New section added

### **Issue Date: July 12, 2005**

Revised June 30, 2005

Section 02745 Entire section revised.

Section 03412M Article 1.3 revised, Article 1.4 Paragraph E added, Article 1.5 Paragraph C added, and Article 3.7 added.

Section 05120 M Article 1.3 revised, Article 1.4 Paragraph D added, and Article 3.5 added.

### **Issue Date: September 12, 2005**

Revised August 25, 2005

Section 01452M Article 3.1 Paragraph B item 1 replaced.

Section 01571 Entire section replaced.

Section 01574M Article 1.1 replaced, Article 1.3 Paragraph B added, and Article 3.1 Paragraphs F and G added.

Section 01721M Article 1.2 replaced.

Section 02842M Article 1.3 Paragraph C and Article 2.1 Paragraph A replaced.

Section 13551M Article 1.3 replaced, Article 2.1 replaced, Article 3.3 Paragraph C replaced, Article 3.5 Paragraph C replaced, and Article 3.5 Paragraph D added.

Section 13552M Article 1.1 Paragraph A replaced, Article 1.3 replaced, Article 2.2 through Article 2.6 replaced, Article 2.8, Paragraph C added, and Article 3.2 replaced.

Section 13553M Article 1.2 paragraphs I and J replaced, Article 1.3 replaced, Article 2.1 Paragraphs H and I replaced, Article 3.1 Paragraph F replaced, Article 3.1 Paragraph Q3 replaced, Article 3.2 Paragraph A replaced, Article 3.3 Paragraph F replaced, Article 3.4 Paragraph C added, and Article 3.5 Paragraph C added.

Section 13554M Article 2.2 replaced and Article 3.1 Paragraph N through H replaced.

Section 13555M Article 1.3 Paragraph E added, Article 2.1 Paragraph A replaced, Article 3.1 Paragraph D deleted, Article 3.2 Paragraphs C, G, and H replaced, Article 3.4 replaced, and Article 3.6 Paragraphs A and B replaced.

Section 13556 Entire section revised.

Section 13561M Article 2.1 Paragraph K added, Articles 3.1 Paragraphs E through G replaced, and Article 3.2 Paragraph A replaced.

Section 13594M Article 2.3 Paragraph A replaced, Article 2.3 Paragraph C replaced, Article 2.4 replaced.

## **Issue Date: November 9, 2005**

Revised October 27, 2005

Section 00725M Article 1.2, paragraph B added, Article 1.4 replaced.

Section 02745 Entire section originally revised July 12, 2005. This change corrected error in Table 13, Float Test.

## **Issue Date: March 2, 2006**

Revised February 23, 2006

Section 00555M Article 1.6, paragraph A replaced.

Section 00725M Article 1.2, paragraph B added, Article 1.4 replaced, Article 1.18 Paragraph C1 added, article 1.18 Paragraph D replaced, and Article 1.18 Paragraphs E – I replaced. **(Replaces Supplemental Specification 00725M issued November 9, 2005.)**

Section 00820M Article 1.2 replaced, Article 1.15 replaced, and Article 1.16 replaced.

Section 01280M Article 1.3 replaced and Article 1.10 deleted.

Section 01574M Article 1.1 replaced, Article 1.3 Paragraph B added, Article 1.4, paragraph B1 added, Article 3.1 Paragraphs F and G added, and Article 3.4, paragraph A replaced. **(Replaces Supplemental Specification 01574M issued September 12, 2005.)**

Section 01721M Article 1.1, Paragraph A replaced, Article 1.2 replaced, Article 1.5, Paragraph F and G replaced, Article 3.3, Paragraph C deleted, and Article 3.11 replaced. **(Replaces Supplemental Specification 01721M issued September 12, 2005.)**

Section 02317 Entire section revised.

Section 02748M Article 2.1, Paragraph A replaced, Article 2.2, Paragraph A replaced, and Article 3.2 replaced.

## **Issue Date: May 2, 2006**

Revised April 27, 2006

Section 02633 New section added.

Section 13557 Entire section revised. Title changed.

## **Issue Date: July 11, 2006**

Revised June 29, 2006

Section 01452M Article 1.5, paragraph B replaced, Article 3.1 Paragraph B item 1 replaced, and Table 1 replaced.

Section 01455 Entire section revised.

Section 01561 Deleted by change to Section 01571.

Section 01571 Entire section revised. Deleted Sections 01561 and 01574.

Section 01574 Deleted by change to Section 01571.

Section 02610 Entire section revised.

Section 02645 Entire section revised. Title changed.

Section 02896M Article 3.1, paragraph A replaced, Article 3.3, paragraph C7 added, and Article 3.3, paragraph E replaced.

**Supplemental Specification  
2005 Standard Specification Book**

**SECTION 01452M**

**PROFILOGRAPH AND PAVEMENT SMOOTHNESS**

**Delete Article 1.5, paragraph B and replace with the following:**

- B. The Department evaluates the surface by section, defined as:
  - 1. Class I surface, 0.1 mile in length, including adjacent shoulder. (Refer to Table 1 for definition of Class I surfaces)
    - a. Testing consists of a single trace measurement of each wheel path, defined as a continuous parallel line 2.5 ft inside the projected lane or median lines.
    - b. Testing of adjacent shoulders having a design width greater than 6.0 ft consists of a single trace measurement, approximately centered in the shoulder. Do not test shoulders having a design width 6.0 ft or less.
    - c. Determine the Profile Index (PI) by taking the average of all profile traces taken on the section.
      - 1) Include profile trace deviations from manholes, valves, and other facilities in the profile trace, when the contract requires the adjustment or reconstruction of these facilities.
      - 2) Exclude profile trace deviations from manholes, valves, and other facilities in the profile trace, when the contract does not include adjustment or reconstruction of these facilities.

**Delete Article 3.1, paragraph B1 and replace with the following:**

- 1. Incentive/Disincentive applies only to Class I surfaces for each pavement section defined in this Section, Article 1.5, paragraph B.
  - a. Incentive/Disincentive is calculated according to Table 2, with partial sections prorated based on length.
  - b. Incentive/Disincentive does not apply to HMA surfaces on projects requiring OGSC or SMA.
  - c. Any section requiring grinding exceeding 20 yd<sup>2</sup> does not qualify for incentive. Disincentive remains applicable for sections where grinding exceeds 20 yd<sup>2</sup>.

**Delete Table 1 and replace with the following:**

Profilograph and Pavement Smoothness  
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**Table 1**

<b>Surface Requirements</b>				
<b>Pavement Category</b>	<b>Class I Surface</b>		<b>Class II Surface</b>	
	<b>Section PI</b>	<b>Profile Deviation</b>	<b>Section PI</b>	<b>Profile Deviation</b>
<b>Category</b>	<b>in/mi</b>	<b>in/25ft</b>	<b>in/mi</b>	<b>in/25ft</b>
1	5	0.3	N/A	0.3
2	7	0.3	N/A	0.3
<b>Category 1</b>	National Highway System and Truck Routes (See Section 02741, Table 11) and all other routes with surfaces having three or more opportunities for improving the ride.*			
<b>Category 2</b>	All other routes incorporating single lift overlays with not more than two opportunities for improving the ride.*			
<b>Class I</b>	Surfaces longer than 1000 ft in length consisting of all traffic and climbing lanes, passing lanes, acceleration and deceleration lanes, ramps, medians wider than 8.0 ft, and turn lanes. Includes bridges and bridge approach slabs with final riding surfaces placed as part of the contract. Excludes horizontal curves having a centerline radius of curvature less than 900 ft and areas within the superelevation transitions to these short radius curves.			
<b>Class II</b>	Surfaces consisting of all tapers, road approaches, mainline pavement sections with posted regulatory speeds less than 35 MPH, pavement within 15 ft of bridge decks and approach slabs not paved as part of the contract, pavement to a point 50 ft beyond the paving limits of the project, and all other surfaces not included in the Class I definition.			

\* Each opportunity to improve the ride is one of the following: Placing a gravel or treated base course, OGSC, SMA, rotomilling, cold recycling, and each lift of paving. Leveling is not considered an opportunity to improve the ride.

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**SECTION 01455**

**MATERIAL QUALITY REQUIREMENTS**

**Delete Section 01455 in its entirety and replace with the following:**

**PART 1      GENERAL**

**1.1      RELATED SECTIONS**

- A.      Section 01355: Environmental Protection

**1.2      REFERENCES**

- A.      UDOT Materials Manual of Instruction Part 8
- B.      UDOT Minimum Sampling and Testing Requirements
- C.      U. S. Code of Federal Regulations

**1.3      SOURCE OF SUPPLY AND QUALITY REQUIREMENTS**

- A.      Use only materials that meet contract requirements.
- B.      Notify the Engineer in writing of the proposed source of materials to be used before their delivery.
- C.      Correct or remove materials that fail to meet contract requirements.
- D.      Use new materials for the work unless otherwise specified.
- E.      Pay all related costs, including those for haul distance and for exploring and developing sources.

**1.4      DEPARTMENT FURNISHED MATERIALS SOURCES**

- A.      Possible sources of local optional materials may be available.
  - 1.      Determine the amount of equipment and work required to produce a material meeting the specifications using these sources.



2. Expect variations in quantity and quality.
  3. Material may be rejected if it is unacceptable or does not meet contract requirements.
- B. Specific information about the location of possible sources is available at the Region Materials Lab.
1. By making this information available, the Department does not represent that a bidder should expect to produce materials corresponding with those previously produced by others, or that the Contractor may expect to produce acceptable materials based upon the interpretation of information, including any quality test information.
- C. Perform required quality tests using a laboratory qualified by UDOT. Submit copies of test reports to Engineer.
1. The Engineer may require additional samples for inspection and testing before authorizing use of the material.
  2. Obtain Engineer's written approval to use material based on Contractor's quality test results.
- D. Prepare materials site plans that show in detail the line and grades to which materials are to be removed.
1. Obtain Engineer's written approval of the materials site plans before removing any material.
- E. Strip and stockpile topsoil before removing any materials.

## **1.5 CONTRACTOR FURNISHED MATERIALS SOURCES**

- A. Obtain required Environmental Clearances. Refer to Section 01355.
- B. Acquire the rights to remove materials and enter into agreement with owner that specifies requirements for grading and reclamation after removing materials.
- C. Locate, where practical, borrow, gravel, and quarry materials sites where they are not visible from the highway.
- D. Perform required quality tests using a laboratory qualified by UDOT. Submit copies of test reports to Engineer.
1. The Engineer may require additional samples for inspection and testing before authorizing use of the material.
  2. Material may be rejected if it is unacceptable or does not meet contract requirements.

- E. Prepare materials site plans that show in detail the line and grades to which materials are to be removed.
  - 1. Obtain Engineer's approval of the materials site plans before removing any materials.
- F. Strip and stockpile topsoil before removing any materials.

## **1.6 FINISHING MATERIAL SOURCE SITES**

- A. Finish all (public and private) material source sites to the satisfaction of the Engineer.
- B. Grade to drain without causing excessive erosion and without altering the natural drainage courses.
- C. Locate waste sites in areas that are least visible from public view. Spread waste material to obtain a natural appearance.
- D. Remove trash. Remove, bury or distribute excess materials over the disturbed areas when excavation has been completed.
- E. Perform required grading and reclamation, as required under the agreement with the property owner, when removal of material is complete and before spreading topsoil.
  - 1. Avoid vertical cuts and sharp corners.
  - 2. Grade side slopes to achieve a natural appearance.
  - 3. Abandon and obliterate haul roads.
- F. Spread topsoil over the excavated area disturbed by construction operations, including obliterated haul roads, and seed all areas with grass or grasses adaptable to the area and approved by the Engineer and property owner. Perform seeding under the contract requirements for seeding, including mulching.
- G. Finishing local material source sites, including seeding and mulching, is not measured or paid for separately and is considered incidental to other items of work.
- H. Before final acceptance, provide the Engineer with a written release from the property owner indicating that all conditions of the agreement are satisfied.

## **1.7 SAMPLES, TESTS, AND REFERENCED CITED SPECIFICATIONS**

- A. Incorporate into the work only material that is inspected, tested, and accepted by the Department. Pay to remove unacceptable materials from the site, at no expense to the Department.
- B. The Department uses the most current Minimum Sampling and Testing Requirements, Materials Manual of Instruction Part 8, and AASHTO or ASTM standards.
- C. The Department performs acceptance testing at its expense, unless otherwise designated.
- D. The Department may inspect, test, and reject materials at any time.
  - 1. Copies of any or all test results are available upon request.
- E. The Department does not allow any extension of contract time for, or as a result of, any testing.
- F. Pay for retesting of materials made necessary by the Contractor's activities.
- G. All Department and Consultant/Contractor materials laboratories and materials test technicians must be qualified under the requirements of the UDOT Materials Manual of Instruction Part 8, to perform material sampling and testing.

## **1.8 CERTIFICATE OF COMPLIANCE**

- A. The Contract or the UDOT Minimum Sampling and Testing Requirements designate manufactured materials and assemblies that can be incorporated in the work, if accompanied by certificates of compliance from the manufacturer.
  - 1. Clearly identify each lot of certified materials or assemblies delivered to the work, and make certain the certificate of compliance accompanies each delivery and identifies the specification requirement satisfied.
  - 2. Make certain the certificates of compliance state the material or assemblies comply with applicable requirements of the Contract, and are signed by a manufacturer's representative in a position to legally bind the manufacturer.
    - a. Photocopies, faxes, and electronically submitted PDF files are acceptable.
- B. The Department may sample and test materials or assemblies used on the basis of certificates of compliance and reject if determined not to meet contract requirements.

- C. Obtain the required certificate of compliance form from the Engineer.

## **1.9 PLANT INSPECTION**

- A. Department may inspect materials at the acquisition or manufacturing source for compliance with specified manufacturing methods. The Department obtains and tests material samples for compliance with quality requirements.
- B. Cooperate fully and assist the Engineer during the inspection.
  - 1. Allow the Engineer full access to all parts of the plant used to manufacture or produce materials.
  - 2. Provide and maintain adequate safety measures.
  - 3. Equip crushing or screening facilities with automatic or semiautomatic mechanical sampling devices.
- C. The Department rejects material not meeting contract requirements.

## **1.10 STORAGE AND HANDLING OF MATERIALS**

- A. Store and handle materials to preserve their quality and fitness for the work.
- B. Transport bulk materials in a manner to prevent loss or segregation after loading and measuring.
- C. Store materials so they can be easily inspected and retested.
- D. Obtain approval from the Engineer to store materials or equipment within the right-of-way.
- E. Additional storage space is at the Contractor's expense and option.
  - 1. Obtain owner's or lessee's written permission before storing material on private property.
  - 2. Furnish copies of the permission to the Engineer, if requested.
- F. Pay to restore storage and plant sites to their original condition or to the satisfaction of the Engineer.

## **1.11 UNACCEPTABLE MATERIALS**

- A. Engineer rejects all materials not meeting the contract requirements.
- B. Remove unacceptable materials immediately from the project site unless the defects are corrected and approved by the Engineer or accepted at a reduced price.

## **1.12 DEPARTMENT FURNISHED MATERIALS**

- A. Deliver or make available Department furnished materials at the locations specified in the Contract. Receive, inventory, store, protect, distribute and install Department furnished material.
- B. Include the cost of handling and placing Department furnished materials in the contract price for the item for which the materials are used.
- C. Contractor is responsible for all materials received. The Department deducts from any monies due:
  - 1. For any shortages, deficiencies, and damage that may occur to the material after delivery.
  - 2. The demurrage charges resulting from failure to accept the material at the designated time and point of delivery.

## **1.13 BUY AMERICA**

- A. Federal-aid projects are subject to Title 23, U. S. Code of Federal Regulations, Part 635.410, Buy America Requirements.
  - 1. Check the appropriate box on the bid proposal indicating the intent to use steel or iron or both of 100 percent domestic supply, or with some foreign supply.
  - 2. If neither box is checked, the Department considers the bid a bid for furnishing domestic steel and iron, and uses only domestic steel and iron in the Contract.
  - 3. The Department awards the Contract to the bidder who submits the lowest total contract bid based on furnishing domestic steel and iron unless the total contract bid exceeds the lowest total contract bid based on foreign steel and iron by more than 25 percent.
- B. To be considered domestic, all steel and iron used and all products manufactured from steel and iron must be produced in the United States.
  - 1. All manufacturing processes, including application of a coating, of these materials must occur in the United States.
  - 2. Coating includes all processes that protect or enhance the value of the material to which the coating is applied. The material applied, as a coating is not covered under Buy America.
- C. If 100 percent steel and iron is furnished, provide a written certification that all contract items using steel and iron are of domestic supply.

- D. The above requirement does not preclude a minimal use of foreign material, provided the cost of material used does not exceed one-tenth of one percent (0.1 percent) of the total contract amount or \$2,500 whichever is greater.

#### **1.14 CONVICT PRODUCED MATERIALS**

- A. Federal-aid projects are subject to Title 23, U. S. Code of Federal Regulations, Part 635.417, Convict Produced Materials.
- B. Materials produced after July 1, 1991, by convict labor may only be incorporated in a Federal-aid highway construction project if such materials have been:
  - 1. Produced by convicts who are on parole, supervised release, or probation from a prison, or
  - 2. Produced in a qualified prison facility and the cumulative annual production amount of such materials for use in Federal-aid highway construction does not exceed the amount of such materials produced in such facilities for use in Federal-aid highway construction during the 12-month period ending July 1, 1987.

**PART 2      PRODUCTS      Not used**

**PART 3      EXECUTION      Not used**

END OF SECTION

**Supplemental Specification  
2005 Standard Specification Book**

**SECTION 01571**

**ENVIRONMENTAL CONTROLS**

**Delete Sections 01561, 01571, and 01574 in their entirety and replace with the following:**

**PART 1      GENERAL**

**1.1      SECTION INCLUDES**

- A.      Requirements for controlling erosion and reducing sediment leaving the construction site and areas under the Contractor's control.
- B.      Requirements for installing, inspecting, maintaining, and removing temporary erosion control measures.
- C.      Requirements when an Environmental Control Supervisor (ECS) is included as a bid item in the proposal.
- D.      Materials and procedures for installing and removing temporary environmental fencing.

**1.2      RELATED SECTIONS**

- A.      Section 01355: Environmental Protection
- B.      Section 02373: Riprap
- C.      Section 02376: Erosion Control Blankets/Channel Liners
- D.      Section 02610: Pipe Culverts
- E.      Section 02613: Culvert End Sections
- F.      Section 02911: Mulch

### **1.3 REFERENCES**

- A. AASHTO M 281: Steel Fence Posts and Assemblies, Hot Wrought
- B. AASHTO M 288: Geotextile Specifications for Highway Applications.
- C. Storm Water Pollution Prevention Plan (SWPPP)
- D. Utah Storm Water General Permit for Construction Activities.

### **1.4 SUBMITTALS**

- A. Prepare and submit a Notice of Intent (NOI) for Storm Water Discharges associated with Construction Activity to the Division of Water Quality at the Utah Department of Environmental Quality (DEQ) along with a signed copy of the NOI to the Engineer, when disturbing one or more acres. NOI forms can be completed online at Division of Water Quality website. Refer to:  
<http://www.udot.utah.gov/index.php/m=c/tid=719>.
  - 1. At the end of construction, submit a Notice of Termination (NOT) form to the Division of Water Quality to terminate the permit, along with a signed copy to the Engineer.
- B. Submit certification to the Engineer that the ECS has completed and passed the examination for UDOT's Environmental Control Supervisor training when the contract proposal includes a bid item for Environmental Control Supervisor (ECS). Contact the UDOT Environmental Division for more information.

### **1.5 TYPES**

Refer to EN series Standard Drawings.

- A. Check Dam:
  - 1. A fiber roll or stone structure placed across a ditch to intercept and trap sediment. Construct so water will flow over a low point in the middle of the dam and not around the sides.
- B. Silt Fence:
  - 1. A geotextile fabric fence to intercept and trap sediment.
- C. Slope Drain:
  - 1. A polyethylene pipe placed on a slope to collect and transport storm runoff down the face of a slope until permanent drainage facilities are installed or vegetation growth is adequate.



- D. Temporary Berm:
  - 1. A ridge of compacted soil, with or without a shallow ditch that diverts storm runoff from a slope to a controlled release point.
- E. Drop inlet Barrier:
  - 1. A fiber roll, silt fence, or stone barrier placed around a drop inlet that intercepts and traps sediment.
- F. Pipe Inlet Barrier:
  - 1. A barrier protecting a pipe inlet that intercepts and traps sediment before it enters the pipe.
- G. Curb Inlet Barrier:
  - 1. A protective barrier placed across a curb inlet that intercepts and traps sediment before it enters the inlet.
- H. Sediment Trap:
  - 1. An excavated basin, usually installed at low points on a construction site that intercepts and traps sediment. Location determined by the Engineer.
- I. Stabilized Construction Entrance:
  - 1. A layer of rock placed at a construction site entrance that removes mud from vehicle tires before tracking onto a paved road.
- J. Straw Bale Barrier:
  - 1. Straw bales placed end to end used where a silt fence would fail. Install to intercept and trap sediment.
- K. Temporary Environmental Fence
  - 1. A visual barrier used to delineate and prevent encroachment on sensitive areas.

## **1.6 PAYMENT PROCEDURES**

- A. Payment for the items associated with this section includes all costs for labor, equipment, and materials for installation, inspection, maintenance, and removal as required.
- B. Liquidated Damages
  - 1. Liquidated damages are assessed against the Contractor in the amount of \$500 for each calendar day, or portion thereof, the project is not in compliance with all required permits and regulations.
    - a. If the Contractor remains not in compliance after three days, the damages assessed are increased to \$1,000 per day and increased to \$1,500 per day after seven days.

2. Fines issued by regulatory agencies against the Department are added to the liquidated damages assessed to the Contractor.
3. No extension of contract time is allowed for any delay resulting directly or indirectly from a violation of environmental requirements.

**1.7 ENVIRONMENTAL CONTROL SUPERVISOR (ECS) REQUIREMENTS (This article applies only when an ECS is included as a bid item in the proposal)**

- A. Qualifications
  1. Knowledge of erosion control principles and best management practices for roadway construction sites.
  2. Knowledge of the laws related to environmental clearances and how to obtain the clearances required under Section 01355.
  3. Ability to understand and implement environmental plans, details, and specifications.
  4. ECS certified by the Department.
- B. Responsibilities:
  1. Implementation of environmental protection commitments and proper installation of mitigation measures associated with the project.
  2. Maintain the environmental compliance.
    - a. Available 24-hours per day seven days per week to respond as necessary to maintain environmental compliance and to the direction of the Engineer.
  3. Obtain environmental clearances in accordance with Section 01355 for disturbances, waste sites, staging areas, etc. not specifically provided in the contract.
  4. Comply with the requirements of Utah Storm Water General Permit for Construction Activities – Permit No.: UTR100000. Refer to: <http://www.udot.utah.gov/index.php/m=c/tid=719>
  5. Comply with all requirements of U.S. Army Corps of Engineers Nationwide or Individual Permit or a Utah Division of Water Rights Regional General Permit 40, when applicable.
- C. Regulatory Agency Coordination
  1. Work with the Engineer to maintain coordination and communication between the Contractor, Department, and regulatory agencies. Process all official communication through the Engineer.
  2. Coordinate and conduct on-site meetings on an as-needed basis with all regulatory agency inspectors.
  3. Notify the Engineer in writing of the results of any agency coordination meeting within 24-hours.

## **PART 2      PRODUCTS**

### **2.1      MATERIALS**

- A.    Check dams:
  - 1.    Fiber Roll:
    - a.    Fiber Roll: Contact Engineer for currently approved products.
    - b.    Wood stakes: commercial quality lumber 2-inch square (nominal) by 3 feet.
    - c.    Channel Liner: Contact Engineer for currently approved products.
  - 2.    Stone: Well-graded within 2 to 6 inches in diameter.
  
- B.    Silt Fence:
  - 1.    Silt Fence Fabric: See AASHTO M 288 (Table 6 – Temporary Silt Fence Property Requirements).
  - 2.    Wood Post: commercial quality lumber, 2-inch square (nominal) by 4 feet.
  - 3.    Fasteners: Staples, wire, zip ties, or nails sufficient to maintain fabric attachment to post.
  
- C.    Slope Drain:
  - 1.    Pipe Culverts: Refer to Section 02610.
  - 2.    End Section: Refer to Section 02613.
  - 3.    Loose Riprap: Refer to Section 02373.
  - 4.    Wooden stakes: commercial quality lumber 2-inch square (nominal) by 3 feet.
  
- D.    Temporary Berm:
  - 1.    Existing Soil.
  
- E.    Drop Inlet Barriers:
  - 1.    Fiber Roll: Contact Engineer for currently approved products.
  - 2.    Stone: Well-graded within 2 to 6 inch diameter.
  - 3.    Silt Fence: See AASHTO M 288 (Table 6 – Temporary Silt Fence Property Requirements).
    - a.    Wood stud: 2 inches x 4 inches (nominal).
  
- F.    Pipe Inlet Barrier:
  - 1.    Stone: Well-graded within 2 to 6 inch in diameter.
  - 2.    Fiber Roll: Contact Engineer for currently approved products.
  
- G.    Curb Inlet Barrier:
  - 1.    Concrete Building Blocks.
  - 2.    Stone: Well-graded within 2 to 6 inch diameter

- 3. Wire Mesh: 0.5 inch by 0.5 inch openings.
  - 4. Wood stud: 2 inches x 4 inches (nominal).
- H. Sediment Trap:
  - 1. Loose Riprap: Refer to Section 02373.
- I. Stabilized Construction Entrance:
  - 1. Stone: Well-graded within 2 to 3 inch in diameter.
- J. Straw Bale Barrier:
  - 1. Straw Bales: Obtained from weed free fields that have been certified by the Utah Department of Agriculture.
- K. Temporary Environmental Fence
  - 1. Fence Fabric
    - a. Polyethylene, high-density, UV stabilized
    - b. Width: 4 ft minimum
    - c. Color: orange
  - 2. Posts
    - a. Meet AASHTO M 281
    - b. Painted or galvanized metal "T" post, 5 ft to 6 ft long

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Do not begin any earth-disturbing activity until the NOI form has been completed and submitted to the Division of Water Quality and the Engineer when disturbing one or more acres.
- B. Understand and comply with the requirements of Utah Storm Water General Permit for Construction Activities.
- C. Follow the Storm Water Pollution Prevention Plan (SWPPP) provided in the plan set.
  - 1. Create and submit a plan to the Engineer if a SWPPP is not provided in the plans when any earth-disturbing activities are required.
    - a. Address all disturbed areas including, but not limited to, staging areas, haul roads, borrow sites, stockpiles, and disposal areas.

- b. Do not start earth-disturbing activity until the SWPPP is approved and project perimeter erosion control measures, and those protecting environmentally sensitive areas, are in place.
      - 1) Obtain written approval from the Engineer to change the SWPPP.
  - 2. Work directly with the Engineer's designated ECS.
    - a. Be available as needed to coordinate the SWPPP, inspect and maintain erosion control devices, and resolve other sediment and erosion control issues.
  - 3. Maintain a copy of the approved SWPPP with the following information on the project site at all times:
    - a. SWPPP title sheet
    - b. EN series Standard Drawings
    - c. Erosion and sediment control plan sheets
    - d. Project specific details and all contract specifications
- D. Use the most restrictive requirement if a conflict occurs between erosion and sediment control specifications and federal, state, or local agency's laws, rules, or regulations.
- E. Install temporary environmental fence, when required, before construction begins.

### **3.2 INSTALLATION**

- A. The erosion control measures in the SWPPP are illustrative. Adapt measures in the field to meet their intended purpose and implement appropriate erosion control measures necessary as the project progresses. Make required changes to the SWPPP to accommodate construction sequencing with the approval of the Engineer.
- B. The Engineer may direct the installation of additional erosion control measures. Install additional erosion control measures as directed.
- C. Follow installation procedures outlined in the EN series Standard Drawings.
- D. Provide or construct measures such as check dams, silt fence, slope drains, drop inlet barriers, sediment traps, and other erosion control devices or methods to reduce erosion and sedimentation.
- E. Install stabilization measures (Refer to Sections 02376 and 02911) as soon as practical on newly disturbed areas, but in no case later than 14 days after disturbance, unless further construction activity precludes installation and will resume inside that area within 21 days from when activity ceased.
  - 1. Install stabilization measures before seasonal shut down.

- F. Install temporary environmental fence in the required locations.
  - 1. Install posts at a 12 ft maximum spacing so the fence does not sag more than 2 inches between posts.
  - 2. Weave the fence over the support posts alternating every two loops and secure it to the posts with wire or plastic ties.

### **3.3 INSPECTION**

- A. Inspect all denuded areas during construction to determine potential erosion problems. Apply corrective measures as required.
- B. Upon beginning earth-disturbing activities, inspect erosion control measures, including sediment retention structures, at least once per week and within 24 hours after any storm event greater than ½ inch. Conduct inspections at least once per month when construction activities are temporarily or seasonally shut down.
  - 1. Invite the Engineer to inspections.
  - 2. After each inspection, complete an inspection report and submit it to the Engineer within 24 hours of the inspection. Include the following information:
    - a. Names of personnel attending, and date of the inspection.
    - b. List of problems identified in the previous inspection and note whether or not corrections have been made.
    - c. List by location, earth-disturbing activities since previous inspection.
    - d. List by location, erosion and sediment control measures installed since previous inspection.
    - e. List by location, new and unresolved problems encountered with specific erosion control measures. Describe solutions to be implemented.

### **3.4 MAINTENANCE**

- A. Maintain erosion control devices in order that they function properly until all disturbed areas draining to them are stabilized.
- B. Remove and properly dispose of sediment when it has accumulated half way up the overall structure height, or when it interferes with the performance of the structure.
- C. Dispose of sediment removed from erosion control structures in a manner acceptable to the Engineer.

### **3.5 REMOVAL**

- A. After all seeding and mulching has been placed and within two weeks of project acceptance, remove any remaining sediment from behind and around erosion control features and remove all temporary erosion control features unless directed differently by the Engineer.
- B. Remove temporary environmental fence and posts upon completion of construction.
  - 1. Temporary environmental fence and all components becomes property of the Contractor when construction is complete.

END OF SECTION

**Supplemental Specification  
2005 Standard Specification Book**

**SECTION 02610**

**PIPE, PIPE-ARCH, STRUCTURAL PLATE PIPE, AND  
STRUCTURAL PIPE ARCH**

**Delete Section 02610 in its entirety and replace with the following:**

**PART 1      GENERAL**

**1.1      SECTION INCLUDES**

- A.      Materials and procedures for installing pipe.
- B.      Class, type, size, and thickness designations.
- C.      Asphalt coating for pipe.

**1.2      RELATED SECTIONS**

- A.      Section 02317: Structural Excavation
- B.      Section 02330: Embankment
- C.      Section 03055: Portland Cement Concrete
- D.      Section 03310: Structural Concrete

**1.3      REFERENCES**

- A.      AASHTO M 36: Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
- B.      AASHTO M 55: Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
- C.      AASHTO M 86: Concrete Sewer, Storm Drain, and Culvert Pipe
- D.      AASHTO M 167: Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches



- E. AASHTO M 170: Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
- F. AASHTO M 196: Corrugated Aluminum Pipe for Sewers and Drains
- G. AASHTO M 197: Aluminum Alloy Sheet for Corrugated Aluminum Pipe
- H. AASHTO M 198: Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
- I. AASHTO M 207: Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
- J. AASHTO M 219: Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
- K. AASHTO M 243: Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe Arches, and Arches
- L. AASHTO M 245: Corrugated Steel Pipe, Polymer Precoated, for Sewers and Drains
- M. AASHTO M 246: Steel Sheet, Metallic-Coated and Polymer Precoated for Corrugated Steel Pipe
- N. AASHTO M 274: Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe
- O. AASHTO M 294: Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter
- P. AASHTO M 304: Polyvinyl Chloride (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
- Q. AASHTO National Transportation Product Evaluation Program
- R. AASHTO Standard Specifications for Highway Bridges
- S. ASTM A 849: Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
- T. ASTM C 828: Standard Test Method for Low Pressure Air Test of Vitrified Clay Pipe Lines
- U. ASTM C 924: Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method

- V. ASTM C 969: Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Sewer Lines
- W. ASTM C 1103: Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
- X. ASTM D 1784: Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
- Y. ASTM D 3212: Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- Z. ASTM D 3350: Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- AA. ASTM F 477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- BB. ASTM F 1417: Standard Test Method for Testing Installation Acceptance of Plastic Gravity Flow Sewer Lines Using Low Pressure Air
- CC. Utah Occupation Safety and Health Regulations

## **1.4 DEFINITIONS**

- A. Pipe and Pipe Arch are identified according to diameter or by span and rise, the following definitions, and according to corrosion class.
  - 1. Cover - The vertical extent of soil above the crown of the pipe or culvert. Refer to DG Series Standard Drawings.
  - 2. Cross Culvert - A transverse drain, covered with embankment that allows surface runoff to pass under the embankment.
  - 3. End Section - A structure commonly made of steel or concrete that is attached to one or both ends of a culvert or a pipe to retain the embankment, improve appearance, provide anchorage, improve discharge and limit scour at the opening.
  - 4. Headwall - A structure, commonly made of concrete, placed at the end of culvert inlet or outlet or storm drain outlet, to anchor the pipe, to retain the highway embankment near the pipe end, and to protect the pipe ends from bank erosion and channel bed scour.
  - 5. Invert - The floor, bottom, or lowest part of the internal cross section of a culvert, conduit or storm drain.
  - 6. Irrigation Pipe - A pipe designed to carry seasonal irrigation water by gravity flow.

7. Paved Invert - Lining of concrete, bituminous or other materials, placed in the invert to protect the invert from abrasion or to improve the culvert hydraulics.
  8. Rise - The vertical height dimension of a box, pipe arch, and arch structure.
  9. Skew - The angle between a line perpendicular to the roadway centerline and the longitudinal direction of the culvert barrel.
  10. Soffit - The inside top or roof of a culvert, conduit, or storm-drain pipe.
  11. Span - The horizontal dimension of a box culvert, pipe arch, or arch structure.
  12. Storm Drain - A closed conduit or waterway that collects and conveys storm runoff that has drainage structures at the ends of individual pipe runs such as catch basins, drop inlets, man-holes, endwalls, and other similar features by gravity flow.
- B. Corrosion Classification:
1. Class A: Pipe used in mostly non-reactive soils that requires no special materials, treatments, or coatings.
  2. Class B: Pipe used in moderately reactive and corrosive soils.
  3. Class C: Pipe used in soils that are highly reactive and corrosive.
  4. Class D: Untreated structural plate pipe used in mostly non-reactive and non-corrosive soils.
  5. Class E: Structural plate pipe used in highly reactive and corrosive soils.

## **1.5 SUBMITTALS**

- A. Provide a manufacturer's Certificate of Compliance showing that furnished pipes meet or exceed the requirements in this Section, Article 2.4 paragraph A.1.
- B. Provide certification that the company manufacturing HDPE pipe is enrolled in the National Transportation Product Evaluation Program (NTPEP) and that the particular pipe size they are furnishing has been tested and meets AASHTO minimum requirements for HDPE pipe.
- C. Furnish a Certification of Compliance from the manufacturer certifying coating thickness.

## **1.6 ACCEPTANCE CRITERIA**

- A. General
  1. Pipes are accepted according to the criteria outlined in this section. Perform the acceptance testing, or use the services of a UDOT approved third party testing company.

2. Pipes are accepted after verification that the following elements meet the specification's requirements:
  - a. Horizontal and vertical alignment deviations
  - b. Barrel distortion
  - c. Damage to the pipe
  - d. Joints
  - e. Coating integrity

**B. Requirements**

1. Horizontal and vertical alignment deviations
2. Remove and reinstall all pipes that exceed the alignment tolerances shown in Table 1.

**Table 1**

<b>Tolerances</b>		
<b>Installation Alignment Tolerances</b>		
<b>Design Grade</b>	<b>Horizontal Deviation</b>	<b>Vertical Deviation *</b>
		inches/100feet
> 1 %	Horizontal joint deflections not to exceed industry standards	1 1/2
≤ 1 %		1
< 0.5 %		± 0.5

\* For cross culverts increase tolerance by 50 percent.

3. Joints
  - a. Cross Culverts - Provide pipes with joints that pass a 3 psi pressure test in the laboratory according to this Section, Article 2.4 paragraph A.
  - b. Storm Drains – Provide pipes with joints that pass a 5-psi pressure test or any other pressure requirements specified in the plans. Test pipes according to this Section, Article 2.4 paragraph A.
  - c. Irrigation pipe – Provide pipes with joints that pass laboratory tests for 5 psi or any other pressure requirements specified in the plans.
  - d. Pipe arches and structural plate pipes are installed per manufacturer's recommendations and are not pressure rated.
4. Allowable distortions – Provide installed pipes that do not have ovaling or distortions greater than 5 percent of the nominal pipe diameter. Measure distortions using a mandrel or directly. For nominal pipe diameter larger than 48 inches, use measured diameter to calculate the 5 percent tolerance limit.

- C. Inspection and testing
1. The inspection and testing is divided into two categories:
    - a. Cross Culverts
    - b. Storm drains and irrigation pipes.
  2. Table 2 shows the inspection and testing required according to pipe category. Inspect or test with the Engineer or his representative present, the cross culverts, storm drains, and irrigation pipes installation prior to placing the roadway pavement.

**Table 2**

<b>Pipe Testing Requirements According to Pipe Function</b>					
Pipe Category and Size	Visual		Physical		Leakage
	Sight	Video Recording	Manual Measure	Mandrel See Article 1.6.C6	Air or Water Test
Cross Culverts ≤ 48-inch dia.		X*	X*	When visual shows non compliance with criteria in this section	
Cross Culverts > 48-inch dia.	X		X		
Storm Drains/Irrigation Pipes ≤ 48-inch dia.		X*	X*	When visual shows non compliance with criteria in this section	When visual test shows non compliance with criteria in this section
Storm Drains/Irrigation Pipe > 48-inch dia.	X		X		When visual test shows non compliance with criteria in this section

\* Both methods are acceptable for pipes with diameters larger than 30-inches

3. Inspect 25 percent of all the cross culvert, storm drain installations, and irrigation pipe units, selected by the Engineer. Round to the highest whole unit. Test any pipes with apparent defects as directed by the engineer. The Department will pay the cost of any requested additional tests that show the pipe tested being in compliance with the criteria in this section.
4. Sample Unit
  - a. Cross culverts, the entire length of the cross culvert.
  - b. Closed conduits, such as storm-drains and irrigation pipes, the entire length of pipe between manholes or other junction structures.

5. Visual Inspection
  - a. Visually inspect pipes as required in Table 2, with an Engineer's representative. Follow OSHA requirements for inspecting confined entry spaces.
  - b. Provide and use a mobile color video camera with an appropriate light to show the interior of the pipe, be able to move inside the pipe barrel, and be controlled remotely by the inspector, to inspect installed pipes as required in Table 2.
  - c. Provide a remote monitor and a recording apparatus for the camera, to view and record the condition of the installed pipes.
  - d. Provide a digital copy of the pipe inspection video recording to the Engineer.
6. Mandrel Test - When visual inspection documents pipe deformation of concern, the Engineer can require a mandrel test according to the following criteria.
  - a. Test pipe by hand pulling a fabricated mandrel through the sample unit.
  - b. Provide and use mandrels to verify that the installed pipes meet the specification requirements in Table 2 of this specification.
  - c. Provide the following:
    - 1) A mandrel, acceptable to the Engineer.
    - 2) A mandrel with an effective diameter equal to 95 percent of the nominal inside diameter.
    - 3) A proving-ring to verify mandrel size.
    - 4) A mandrel with a minimum of nine equally spaced runners (40 degree angles).
7. Manual Measurement
  - a. Measure manually any distortions (deflections) of pipes as indicated in Table 2 and verify in the presence of the Engineer or his representative that the installed pipes sample meet the criteria in Table 2.
8. Joint Test (for Storm Drains and Irrigation Pipes only) - In addition to the inspection requirements in this Section, Article 1.6 paragraph C, test units with diameters equal to or less than 42 inches when visual inspection indicates noncompliance with the criteria in this section. Test all pipes that have joints showing visible gaps, defects, or any other problem according to one the following testing methods:
  - a. Air Test
    - 1) Test individual joints according to ASTM C 1103.
    - 2) Concrete Pipe - Test according ASTM C 924.
    - 3) Plastic Pipe - Test according to ASTM C 828 or C 924 or F 1417 and manufacturer's recommendations.
  - b. Exfiltration Test
    - 1) Test all pipe material types according to AASHTO M 86 and ASTM C 969.

- 2) Maintain head for one hour.
- 3) Do not exceed leakage values in Table 3.
- 4) Locate source or sources of leakage and repair damaged storm drain or irrigation system that does not pass the test.

**Table 3**

<b>Leakage Test Allowances</b>	
Nominal Pipe Diameter (Inches)	Maximum Leakage Allowed (Gal/hr/100 feet)
18	4.5
24	6
30	7.5
36	9
42	10.5
48	12

**D. Quality Assurance**

1. Repair or replace damaged or improperly installed pipes in a sample unit at the direction of the Engineer.
2. Repair according to manufacturer's recommendations pipes that fail the Joint Test in this Section, Article 1.6 paragraph C at no cost to the Department. Retest the repaired pipes. Remove and replace pipes if they fail retest.
3. Provide engineering analysis certifying the structural and hydraulic integrity of the pipe, stamped by a professional engineer registered in Utah, for all pipes that fail the mandrel test and that do not exceed 10 percent deflections, to the Resident Engineer and Central Hydraulics for the pipe acceptance.
4. Apply the pay reduction schedule in Table 4, for sample units left in place that have pipes that do not meet mandrel test requirements, if an engineering analysis is not performed:

**Table 4**

<b>Payment Reductions</b>	
<b>PIPE DEFLECTION MEASURED</b>	
Amount of Deflection (%)	Payment
0.0 to 5	100% of the Unit Bid Price
5.1 to 9.9	75% of the Unit Bid Price
10 or greater	Remove and Replace

5. Remove and replace all pipes that exceed 10 percent deflections.

## PART 2 PRODUCTS

### 2.1 PIPE TYPES

- A. Pipe, Pipe Arch, Structural Plate Pipe and Structural Plate Pipe Arch Types:  
Refer to Table 5.

**Table 5**

<b>AASHTO Reference Specifications for Pipe</b>					
<b>Pipe Type</b>	<b>Pipe Class</b>				
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Substitutions: Class B and C may be substituted for Class A, Class C may be substituted for Class B or A, Class E may be substituted for Class D.</b>					
<b>Corrugated Pipe and Pipe Arch:</b>					
Corrugated steel pipe.	M 36	M 36	M 36	N/A	N/A
Corrugated steel pipe arch. (1)		Polymeric Coating 0 µm (inside)/250 µm (outside) M 245 & M 246 ASTM A 849 or Aluminized Type II Steel M 274 (2)	Polymeric Coating 250 µm (inside)/250 µm (outside) M 245 & M 246 ASTM A 849		
Corrugated aluminum pipe.	M 196	M 196	M 196	N/A	N/A
Corrugated aluminum pipe arch. (1)	M 197	M 197	M 197		
Corrugated polyethylene (HDPE) pipe	M 294 ASTM D 3350	M 294 ASTM D 3350	M 294 ASTM D 3350	N/A	N/A
<b>Smooth-Lined Pipe and Pipe Arch:</b>					
Concrete lined corrugated steel pipe  (Use Type V cement. Refer to Section 03055)	M 36	M 36  Polymeric Coating 250 µm (inside)/250 µm (outside) M 245 & M 246 ASTM A 849	M 36  Polymeric Coating 250 µm (inside)/250 µm (outside) M 245 & M 246 ASTM A 849	N/A	N/A
Corrugated Polyethylene Pipe, 300- to 1500-mm Diameter	M 294 ASTM D3350	M 294 ASTM D3350	M 294 ASTM D3350	N/A	N/A
Smooth lined Polyvinyl chloride (PVC) pipe	M 304 Cell Class # 12454C ASTM D 1784	M 304 Cell Class # 12454C ASTM D 1784	M 304 Cell Class # 12454C ASTM D 1784	N/A	N/A



<b>AASHTO Reference Specifications for Pipe</b>					
<b>Pipe Type</b>	<b>Pipe Class</b>				
	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Substitutions: Class B and C may be substituted for Class A, Class C may be substituted for Class B or A, Class E may be substituted for Class D.</b>					
Spiral rib steel pipe	M 36	M 36	M 36	N/A	N/A
Spiral rib steel pipe arch		Polymeric Coating 0µm (inside)/250 µm (outside) M 245 and M 246, ASTM A 849 or Aluminized Type II Steel M 274 (2)	Polymeric Coating 250 µm (inside)/250 µm (outside) M 245 and M 246 ASTM A 849		
Spiral rib aluminum pipe and pipe arch	M 196 and M 197	M 196 and M 197	M 196 and M 197	N/A	N/A
Reinforced concrete pipe	M 170 Type II Cement	M 170 Type II Cement	M 170 Type V Cement required	N/A	N/A
Non-reinforced concrete pipe	M 86 Type II Cement	M 86 Type II Cement	M 86 Type V Cement required	N/A	N/A
Elliptical reinforced concrete pipe	M 207 Type II Cement	M 207 Type II Cement	M 207 Type V Cement required	N/A	N/A
<b>Structural Plate Pipe and Pipe Arch:</b>					
Structural steel plate pipe and pipe arch	N/A	N/A	N/A	M 167	M 167 M 243
Aluminum alloy structural plate pipe and pipe arch	N/A	N/A	N/A	M 219	M 219
<b>Footnotes:</b> (1) Minimum corner radii conforming to the details shown on the standard drawings. (2) Acceptable Soil Conditions, Class B, Aluminized Type II Steel are: 1.6mm minimum thickness of metal acceptable where pH is greater than 7 and less than 8.5, and soil resistivity is greater than 1500 ohm-centimeters.					

## 2.2 RELATED PRODUCTS

- A. Asphalt Coating: Furnish Material Class M-Mastic, either asphalt or tar base, cold applied. Refer to AASHTO M 243 and ASTM A 849.

## 2.3 PIPE SELECTION

- A. Use the same type and strength or thickness for the entire run of pipe.
- B. Use the maximum height of cover to determine the strength or thickness. Refer to the DG series Standard Drawings.
- C. Do not use aluminum pipe when a paved invert is required, unless protective measures are taken. Follow this Section, Article 3.7 paragraph C.

- D. Corrugated and smooth-lined high density polyethylene pipes: Use only HDPE Plastic Pipe up to 60-inch diameter that is certified by AASHTO National Transportation Product Evaluation Program (NTPEP) to meet AASHTO M 294 requirements and. Provide a copy of NTPEP certification to the Engineer.
- E. Corrugated and smooth-lined PVC pipes: Use up to 36 inch diameter.
- F. Furnish Material Pipe Coating Class M-Mastic, either asphalt or tar base, cold applied. Refer to ASTM A 849.
- G. Precast, non-reinforced concrete pipe: Use only 18 inch to 36 inch diameter.
- H. Do not allow pipes of different types of metal to contact each other. Use matching materials to make direct extensions of existing pipes.
- I. Do not use pipe containing longitudinal lap seams if watertight pipe or watertight joints are called for.
- J. Do not use thermoplastic pipe manufactured without UV inhibitors approved by the Materials Engineer in applications subject to direct sunlight.

## **2.4 JOINTS OR COUPLING BANDS FOR PIPES**

- A. General:
  - 1. Furnish pipes with joints that can sustain 3 psi minimum pressure for all cross culverts or 5 psi minimum pressure for all storm-drains and irrigation pipes, tested according to the proper AASHTO and ASTM test requirements by an independent lab or witnessed by a UDOT representative, for each pipe type.
  - 2. Comply with manufacturer's recommendations for connecting pipes and for connecting pipes to concrete headwalls, catch basins, and similar structures.
- B. Concrete Pipes:
  - 1. Meet AASHTO M 198.
- C. Metal Pipe:
  - 1. Conform to AASHTO Standard Specifications for Highway Bridges and AASHTO M 36 or AASHTO M 245 with the following modifications:
    - a. Use connecting bands of the same class as the pipe. Maintain a minimum thickness of 0.064 inch for the connecting bands.
    - b. Use bands with projections (dimple bands) only in extension of existing pipes where annular corrugations do not exist.

- c. Re-role ends of helically corrugated pipe to form at least two full annular corrugations each before being joined.
  - d. Use flat bands only when approved in writing by the Engineer.
  - e. Follow DG series Standard Drawings.
- D. Test joints in the lab in accordance with ASTM D 3212.
- E. Joints for PVC Pipes: Show no leakage when tested in accordance with ASTM D 3212. Meet ASTM F 477 for gaskets.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Excavating, Trenching, Bedding and Backfill:
  - 1. Refer to Section 02317.
  - 2. Refer to DG series Standard Drawings.

### **3.2 INSTALLATION**

- A. Follow manufacturer installation requirements for installing all types of pipe.
- B. Install pipe to conform to AASHTO Standard Specifications for Highway Bridges.

### **3.3 SMOOTH LINING FOR CORRUGATED STEEL PIPE AND PIPE ARCH**

- A. Clean all surfaces to be lined including removal of all oil and grease from the metal. Allow the surface to dry before proceeding.
- B. Concrete Lining: Follow ASTM A 849, Subsections 5 and 9.
- C. Asphalt Lining: no asphalt coating.

### **3.4 PIPE AND PIPE ARCH**

- A. Follow AASHTO M 243.
- B. Use materials described in Table 5.
- C. Remove moisture, dirt, oil, un-bonded or incompatible paint, grease residual oil, alkalies, or other foreign matter from the surface to be coated.

- D. Spray or brush-coat all aluminum pipes contacting concrete with an asphalt mastic or tar base material to a minimum thickness of 0.05 inch.

### **3.5 STRUCTURAL PLATE PIPE AND PLATE PIPE ARCH**

- A. Use materials described in Table 5.
- B. Repair or replace all damaged plates or coatings before installation.
- C. Installation: Follow DG series Standard Drawings. Embankment: Refer to Section 02330.
- D. Assembly:
  - 1. Give the Engineer a copy of the detail plan showing the position of each plate and the assembly order.
  - 2. Follow the manufacturer's instructions.
  - 3. Mark clearly each modified plate, designating its position in the finished structure.
  - 4. Place outside circumferential pipe-laps facing upstream.
  - 5. Attain approved seam fit-up. Place and torque all bolts according to manufacturer's recommendation.
  - 6. Form structural plates so that the finished pipe is elliptical with the vertical diameter of round pipe approximately 5 percent greater than the nominal diameter.
- E. No Asphalt Coating allowed.

### **3.6 INVERT PROTECTION**

- A. Paved Invert:
  - 1. Use corrugated steel pipe or pipe arch and structural steel plate pipe or plate pipe arch.
  - 2. Complete backfill and embankment over the pipe before placing paved invert material.
  - 3. Use 10 gage wire fabric with wire spaced at 6 inch centers. Refer to AASHTO M 55.
  - 4. Arc-weld the wire mesh reinforcement to the corrugation at not more than 2 ft centers.
  - 5. Place concrete at least 2 inches above the crest of the corrugations, at least 1/4 of the circumference of round pipe, or the span width of arch pipe. Refer to Section 03055.
  - 6. Finish the concrete to a floated surface finish. Refer to Section 03310.

7. After curing, coat the joint between the pipe and concrete with liquid asphalt at a rate 0.9 gal/yd<sup>2</sup> of residual asphalt. Coat 6 inches above and below the joints.

### **3.7 QUALITY CONTROL**

- A. Provide adequate cover or protection for all pipe during project construction. Replace all damaged pipe before acceptance by the Department.
- B. The following are some causes for rejection:
  1. Irregular or distorted shape (not as provided or designed)
  2. Dents or bends
  3. Damaged, broken, delaminated or scaled coating
  4. Loose bolts or nuts
  5. Uneven laps
  6. Improper fitting joints
  7. Any damage which compromises the functionality and design life of the pipe.
- C. Coatings:
  1. Department will take a representative sample from each lot furnished to conduct verification testing.

END OF SECTION

**Supplemental Specification  
2005 Standard Specification Book**

**SECTION 02645**

**PRECAST CONCRETE BOX AND THREE-SIDED CULVERT  
STRUCTURES**

**Delete Section 02645 and replace with the following:**

**PART 1      GENERAL**

**1.1      SECTION INCLUDES**

- A.      Material and procedures for fabricating and installing single cell precast concrete box culverts and precast conventionally reinforced concrete three-sided culvert structures.

**1.2      RELATED SECTIONS**

- A.      Section 02056: Common Fill
- B.      Section 02317: Structural Excavation
- C.      Section 02324: Compaction
- D.      Section 03055: Portland Cement Concrete
- E.      Section 03211: Reinforcing Steel and Welded Wire
- F.      Section 03310: Structural Concrete
- G.      Section 03390: Concrete Curing

**1.3      REFERENCES**

- A.      AASHTO M 198: Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
- B.      AASHTO LRFD Bridge Design Specifications

- C. ASTM C 877: Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
- D. ASTM C 1433: Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
- E. ASTM C 1504: Standard Specification for Manufacture of Precast Reinforced Concrete Three-Sided Structures for Culverts and Storm Drains
- F. UDOT Quality Management Plan

## **1.4 SUBMITTALS**

- A. Shop Drawings: Furnish to the Engineer.
  - 1. Shop drawings: Five half-size 11 inch by 17 inch sheets with a 1½ inch blank margin on the left-hand edge.
  - 2. Design calculations for Precast Concrete Three-Sided Structures signed and stamped by a Utah Professional Engineer (PE).
  - 3. Place the State project designation data in the lower right-hand corner of each sheet.
  - 4. Prepare shop drawings under stamp of a Utah PE.
- B. Department rejects units fabricated prior to written approval.

## **1.5 ACCEPTANCE**

- A. Precast concrete box culverts and three-sided structures may be accepted at a reduced price when the concrete strength is below that specified.
  - 1. Price adjustment pay factor following Section 03310.

## **PART 2 PRODUCTS**

### **2.1 CONCRETE**

- A. Wet Cast Concrete: Class 3A(AE). Follow Section 03055.
- B. Dry Cast Concrete:
  - 1. Minimum cement content: 470 lb/yd<sup>3</sup> of concrete
  - 2. Maximum water/cement ratio: 0.40
  - 3. Mix design: Submit for approval

## **2.2 REINFORCING STEEL AND WELDED WIRE**

- A. Coated. Refer to Section 03211.

## **2.3 JOINT SEALANT**

- A. Meet AASHTO M 198.
- B. Use a flexible butyl-blend material with a minimum cross-section of 1 ½ square inches as a joint sealant for box culverts.
- C. Maintain the joint material at 70 degrees F or greater during placement.

## **2.4 JOINT WRAP**

- A. Refer to ASTM C 877.

## **2.5 QUALITY ASSURANCE**

- A. Department pre-qualifies pre-cast concrete box and three-sided culvert section manufacturers in accordance with the UDOT Quality Management Plan: Pre-cast/Prestressed Concrete Structures.
- B. Permanently mark each precast unit with date of casting and supplier identification. Stamp markings in fresh concrete.
- C. Prevent cracking or damage during handling and storage of precast units.
- D. Replace cracked or damaged precast units at no additional cost to the Department.

## **PART 3 EXECUTION**

### **3.1 MANUFACTURE**

- A. Precast Concrete Box Culverts:
  - 1. Meet ASTM C 1433.
  - 2. Multiply steel reinforcement requirements shown in table by 1.25, unless designed for HS-25 or greater loading.



3. Provide minimum reinforcing steel spacing 4 inches around circumference and 8 inches longitudinal.
  4. Provide 1 inch minimum concrete cover to reinforcing steel for box sections covered with 2 feet of fill or greater.
  5. Provide 2 inch minimum concrete cover to all reinforcing steel for box sections covered with less than 2 feet of fill.
- B. Precast Concrete Three-Sided Structures:
1. Meet requirements in ASTM C 1504 with the following exceptions:
    - a. Design structure in compliance with AASHTO LRFD Bridge Design Specifications, Section 12.14.
    - b. Design for HL-93 live loading.
  2. Provide minimum reinforcing steel spacing of 4 inches around circumference and 8 inches longitudinal.
  3. Provide 1 inch minimum concrete cover to reinforcing steel for three-sided sections covered with 2 feet of fill or greater.
  4. Provide 2 inch minimum concrete cover to all reinforcing steel for three-sided sections covered with less than 2 feet of fill.
- C. Portland Cement Concrete: Follow Section 03055.
- D. Concrete Curing: Follow Section 03390.

### **3.2 PREPARATION**

- A. Excavating, Trenching, Bedding, and Backfill:
1. Refer to Section 02317.

### **3.3 BEDDING AND BACKFILL**

- A. Over-excavate the material under the box location in compliance with Section 02317 to a minimum depth of 4 inches.
1. Replace over-excavated material with granular backfill borrow as specified in Section 02056.
  2. Provide a minimum bedding of 4 inches of granular backfill borrow.
- B. Level and compact bedding material to provide uniform support of the structure along its entire supported width and length.
- C. Use a loose sand leveling course no greater than 2 inch in depth if needed in addition to the granular backfill borrow bedding.
1. If loose sand is added, excavate the area to the appropriate depth to accommodate the backfill and leveling course.

- D. Backfill structure with granular backfill borrow as specified in Section 02056.
- E. Compact following Section 02324.
- F. Refer to project plans for excavation, bedding, and backfill requirements where a three-sided culvert structure is placed on a footing.

### **3.4 INSTALLATION**

- A. Inspect precast elements for defects before lowering into trench.
- B. Repair or replace any defective, damaged or unsound precast elements.
- C. Use a trench width adequate to place and compact bedding material. Minimum outside width of trench is the outside width of structure plus 2 feet.
- D. Lay precast elements starting at the downstream end.
- E. Carefully lower precast elements into the trench with suitable equipment to prevent damage.
- F. Remove all dirt and foreign material from joints. Prevent dirt and material from re-entering joints.
- G. Apply joint sealant furnished by culvert manufacturer to box culvert.
  - 1. Place the joint material on the bottom half of the groove (bell) of the box last placed.
  - 2. Place the balance of the joint material on the top half of the tongue (spigot) of the box to be set.
  - 3. Place the material about 1 inch from the leading edge of the groove and tongue.
- H. Disassemble joint, check position of joint sealant, repair alignment, and re-install when adjoining elements cannot be pulled together to meet minimum joint requirements.
- I. Close the joints tightly.
- J. Do not disturb previously completed joints during laying operation.
- K. Do not lay precast elements when water is in the trench.
- L. Clean top and sides of concrete surface at joints before placing joint wrap.

- M. Use appropriate pulling devices to avoid misalignment and damage to box sections.
- N. Place three-sided structure sections against previous sections as tightly as possible, while maintaining alignment.
  - 1. Do not exceed joint tolerances in the stamped drawings.

### **3.5 STEEL REINFORCEMENT**

- A. Follow Section 03211.

### **3.6 JOINTS**

- A. Make joint opening between box sections less than 1 inch measured face to face of adjoining concrete surfaces.
  - 1. Reject box sections when the installation tolerance cannot be met due to casting variations.
  - 2. Prevent soil from being forced into the joint as the box sections are placed.
- B. Provide shear transfer devices for box culvert sections with less than 2 feet of cover.
  - 1. Device or method must be capable of transferring a minimum shear load of 3,000 lbs/ft of joint width through top slab of adjacent units.
  - 2. When using individual devices, space closer than 2.5 ft center to center with a minimum of two per joint.
- C. Mechanically connect the exterior segments of three-sided precast concrete structures at all top joints within a minimum length of 12 feet from each end of the structure.
  - 1. Use a minimum of four mechanical connections per joint with a maximum spacing of 10 feet.
  - 2. Galvanize all plates, shapes and hardware.
- D. Connect three-sided precast concrete structures to the footing/pedestal 2 feet from the outermost exterior edge of the structure at all four corners with a galvanized rigid mechanical connection.
  - 1. Locate the connection on the interior face of the segment to allow for future inspection.

### **3.7 LIFTING HOLES**

- A. Provide a maximum of four lifting holes in the top slab, each having a maximum diameter of 3 inches.
- B. Locate holes to avoid interference with the reinforcing steel.
- C. Plug lift holes and lift insert recesses with a 1/1 sand to cement grout. Finish flush with all concrete surfaces.

### **3.8 CONNECTION TO CAST-IN-PLACE CONCRETE**

- A. Where precast box sections join cast-in-place concrete, project the reinforcing steel a minimum of 12 inches out of the precast box section and square off the concrete face.

### **3.9 REPAIRS**

- A. Box sections may be repaired as allowed in the referenced specification only when approved in advance by the Engineer.
- B. Making repairs in advance of approval will be cause for rejection.

### **3.10 MINIMUM LENGTH**

- A. Do not use pre-cast segments less than 5 foot in lay length.

END OF SECTION

**Supplemental Specification  
2005 Standard Specification Book**

**Section 02896M**

**BOUNDARY SURVEY**

**Delete Article 3.1, paragraph A and replace with the following:**

- A. Place Right-of-Way Markers in accordance with GW series Standard Drawings.  
Stamp onto each Right-of-Way Marker:
  - 1. Right-of-Way marker number
  - 2. Exact control point mark location to within 0.01 feet (center punch or “dimple”)

**Add the following to Article 3.3, paragraph C:**

- 7. On each record of survey map, tabulate right-of-way markers showing, right-of-way marker number, station, offset, elevation, and project coordinates.

**Delete Article 3.3, paragraph E and replace with the following:**

- E. Deliver the survey plat to Engineer on a CD in MicroStation format.